observation and investigation into such problems as those of plant disease is likely to be of the greatest value.

THE Report of the Technical Education Committee of the Derbyshire County Council states that the Technical School at Glossop, erected by Lord Howard of Glossop, has during the past year been furnished and equipped by the Glossop Town Council, aided by a grant of 600*l.* (in addition to the loan of chemical and physical apparatus) from the County Council. There are now nine schools of science in the administrative county, of which seven are co-educational schools for boys and girls. It is sometimes complained that the "school of science" curriculum is not sufficiently commercial, but early specialisation in purely commercial subjects, such as bookkeeping, commercial geography and business letter writing, should certainly not be encouraged. The Committee quotes in this connection Mr. Sydney Webb's remarks that "English business is not being driven to the wall because of a dearth of qualified clerks and trained office boys. . . . What we have to do is to train our business men, be they clerks or partners, not merely or even chiefly to discharge their office routine, but to let their intellects play round their business, to put into their work, not only brains, but brains of the highest or inventive kind. This is where they seem at present to fall behind the German and the American. Now we may take it for granted that we cannot get business men of wider minds by narrowing their education, nor produce that heightening of the imagination which makes discoveries by carefully shutting out all knowledge of the world that is not business. The most efficient business man, in this highest sense of the word efficient, will, we may be sure, not be an uncultivated man nor a man of narrow range."

SCIENTIFIC SERIALS.

Bulletin of the American Mathematical Society, February.—Prof. F. N. Cole is the chronicler of the proceedings at the eighth annual meeting, in New York City, of the Society on December 27, 28, 1901. Though now two days are devoted to the conference, owing to the large number of papers sent in (twenty-seven), this time is hardly adequate, and it is becoming a serious question whether it will not be necessary to adopt a practice of selection, permitting the presentation, even then in condensed form, of more important papers only. The meeting was largely attended, the number of members present amounting to fifty-nine. A social feature was the dinner on the Friday evening. The officers and members of council were elected. Sir Robert Ball was present, and amongst the abstracts of the papers communicated is that of his recent researches in the theory of screws. Miss Scott's paper on a recent method for treating the intersections of plane curves investigates the nature of the set of equations discussed in Dr. F. S. Macaulay's paper in the London Mathematical Society's *Proceedings*, vol. xxxi., giving different and simpler proofs of the theorems obtained by Dr. Macaulay.—Prof. Holgate gives an account of the proceedings at the January meeting of the Chicago section, held at Evanston, Illinois, January 2, 3, 1902. Here also the attendance was unusually large. Nineteen papers were presented, and abstracts of them are here given. "The Vector Analysis" of Dr. E. B. Wilson is reviewed by Prof. A. Ziwet. Prof. Gibbs's "Elements of Vector Analysis" (1881-4) attracted wide attention, though it was only a pamphlet (83 pp.) printed for the use of his students. This Mr. O. Heaviside adopted, with slight modifications, and expounded fully in his "Electromagnetic Theory" (1893). Dr. Wilson's work is founded upon Prof. Gibbs's course of lectures delivered in 1899-1900, and gives the first generally accessible authentic record of Prof. Gibbs's system. The additions to the theory of the (1881-4) pamphlet are not extensive, though Dr. Wilson's book runs into 436 pp. This bulkiness is due to the lavishly open print and partly to the author's effort to make the subject easily intelligible by supplying numerous illustrations and applications. A good index is a desideratum, and the printing details lack the advantage of external aids now so common in carefully printed mathematical text-books.—Mr. J. L. Coolidge gives an interesting notice of Dr. Max Simon's "Euclid und die sechs planimetrischen Bücher" and of Prof. M. J. M. Hill's "The Contents of the Fifth and Sixth Books of Euclid."—The notes and new publications give the usual interesting information.

Memoirs (Trudy) of the Kazan Society of Naturalists, vol. xxxiii., 5 and 6.—Researches into the soils and flora of the Penza and Gorodische districts, by J. Sprigin.—On the Erinaceæ of Russia, by K. Satunin (with one plate). The following five species, found in European Russia, Caucasia and Transcaspian territory, are described:—*Erinaceus europaeus*, *E. auritus*, *E. albulus*, *E. macracanthus* and *E. hypomelas*.

Vol. xxxiv.—This volume is dedicated by the Society to the professor of geology, Alexander Antonovitch Stuckenberg, whose portrait is given.—The Plagioclase-augite rocks between the Yenisei and the Lena, by A. Laversky. A large collection of 350 specimens of these rocks was made thirty years ago by Czekanowski and is now described, the author giving also a general geological review of the region. Cambrian and Silurian deposits constitute the frame of the plateaus. They are covered with coal-bearing, brown Jurassic deposits (perhaps also Miocene), and the latter are pierced and covered with basalts, breccias and volcanic tuffs, which in their turn are occasionally covered with post-Pliocene deposits. The sheets of basalt seem to have been ejected immediately after the deposition of the coal-bearing sandstones, and cover an immense space—larger than anywhere else on the globe—and are similar to the basalt sheets of Novaya Zemlya, Franz Josef Land, Greenland, Jan Mayen, Iceland and the north-western portion of Great Britain. A map and several plates, as also a summary in French, accompany this excellent and very elaborate work.—Materials for the fauna of the Devonian deposits of the Urals, by P. Kazansky, with one plate (summed up in German).—Materials for the knowledge of the soils and the vegetation of Western Siberia, by A. Gordyaghin, part i. Under this modest name the author gives, as an introductory chapter, an excellent description, geographical, geological and botanical, of the region in the basin of the Irtysh (from 49° to 61° N. lat.), where we see the gradual transition from the black-earth steppes to the forest region. Some very interesting discussions about desiccation and the periodical changes in the precipitation in Western Siberia are incorporated in this chapter.—On the Turbellariæ of the Solovetsk Islands, by I. P. Zabusoff. Descriptions of the thirty-nine species, some of which are new, which were found in this part of the White Sea, and anatomical descriptions of four especially interesting forms (long summary in German, and three large plates).—The fauna of the Carboniferous limestone on Shartymka River, on the eastern slope of the Urals, by M. Ianishevsky (seven plates and one map). No less than 328 different species, some of which are new, are described, and the conclusion is that these limestones (described already by Verneuil and Murchison) seem to belong to the Lower Carboniferous age.—First addition to the "Fauna of the Permian Deposits of Eastern European Russia," by A. Netchayeff, with three plates. Eighteen species, of which nine are new, are described in Russian and in German.

Bulletin de l'Académie des Sciences de St. Pétersbourg, 5e série, tome xi., 1-5.—Observations of minor planets, made at Pulkova with the 15-inch refractor in 1898 and 1899, by W. Séraphimoff. The positions of thirty-five minor planets are given.—Observations of terrestrial magnetism at Obdorsk and Samarovo (North Siberia), by H. Abels.—On the products of oxidation of the new alkaloid cotarnine, by G. Wulff.—On the determination of the form of the solar disc, by W. Ceraski.—Actinometric measurements at Ekaterinburg, by P. Müller.—Determination of the velocity and direction of motion of clouds, by V. Kouznetsov (according to Pomortseff's method), with a plate.—Researches into the coefficient of refraction of ethyl ether in the vicinity of the critical point, by Prince B. Galitzin and J. Wilip (in German). The chief results of this elaborate work are: the critical temperature is 193°·61 C.; critical pressure, 36·28 atm.; critical volume, 3·84 c.c. The formula of Lorentz represents very well the relations between the refraction-coefficient and the volume, and covers a wide range of temperatures (10° to 100°), both for the liquid and the gaseous states. The Lorentz constant is $C = 0{\cdot}3025$. "It must also be admitted that in certain circumstances the liquid state may persist above the critical point—a phenomenon which is quite analogous to the retardation of evaporation."—Contributions for explaining various information from oriental sources about Eastern Europe, by F. Westberg. A learned and very interesting series of researches about the information found in these sources about different nations—the Rûs, the Madjars, the Vyes, and so on.—On the classification of the Chrysomonades, by L. Iwanoff (in German). Certain peculiarities of structure

of the genus Mallomonas permit the author to establish a classification of this difficult division.—A new archaic inscription of the Roman forum, by A. Enmann.

Bulletin du Jardin Botanique de St. Pétersbourg, tome ii. fasc. i.—On the causes of the absence of wood on the *yailas* (high mountain plateaus) of Crimea, by G. J. Tanfiljew. The cause is probably in the late thawing of snow—often in May only—and the consequent saturation of the soil with water.—Lichenological notes, by A. A. Elenkin.—Communications.

Memoirs of the Novorossian (Odessa) Society of Naturalists, vol. xxiii., 2.—Remarks on the Crimean stag, by A. Brauner (two plates). Unlike Ward, Nikolsky and Lydekker, the author considers this stag as *C. elaphus*, L., which is near, not to the typical individuals from the forests, rich in food, of middle Europe, but to the island type (also mountain and southern type), and especially to the Corsican representative of this species (summary in German).—On the nitrification of water, by E. Gredig.—Note on the Sarmatian deposits of Transcaucasia, by V. Lashkarev, on the basis of Prof. Ernest Favre's collection at Geneva.—Fauna of the caves of Crimea, by J. Lebedinski, with one plate. First attempt to explore these caves.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 28, 1901.—"Micro-crystalline Structure of Platinum." By Thomas Andrews, F.R.S.

The crystalline structure of platinum does not appear to have been studied, although it forms an interesting subject for investigation. A small ingot of pure platinum was obtained for the experiments. A section was cut therefrom and machined to 5/16th inch square and 1/10th inch in thickness. The section

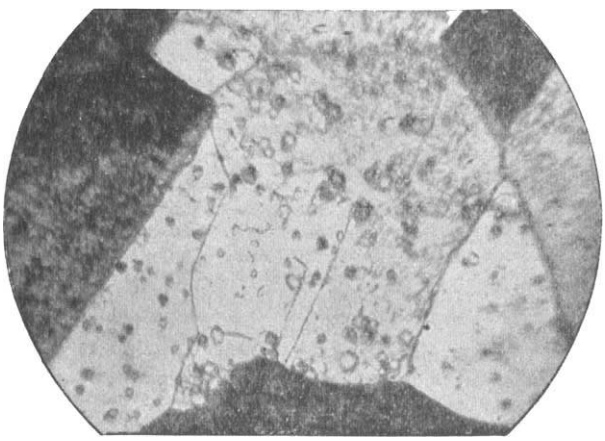

FIG. 1.—Micro-crystalline structure of platinum as seen in section at 360 diameters.

was then carefully polished and etched in aqua regia. The etching was very difficult and required the greatest care in manipulation to satisfactorily develop the crystalline structure. The result of the etching was the development of a beautiful crystalline structure which manifested, not only the large or primary crystal grains, but also the secondary or very minute crystalline development which is illustrated on a plate accompanying the paper, as seen in section at magnifications respectively of 50, 120, 360 and 360 diams. The last two of these figures are here reproduced. The larger or primary crystal grains were observed to consist of irregular polygons of varying size, the etched indications of the facet junctions being often clearly and sharply defined. The minute or secondary crystals (whose intercrystalline junctions were also clearly seen) were in the mass observed to be in varied positions of orientation, but the orientation was generally identical, or on the same plane, within the area of each larger crystal grain. The general orientation of the smaller crystals varied, however, in each separate larger crystal, and the consequent varied reflection of the light has given the face of the microsections, as a whole, the appearance of lighter or darker areas in the photomicrographs. In some portions of the mass there were observed minute triangular crystals; these appear, however, to be only developments resulting from the cutting of certain crystals in section. The general microcrystalline structure of platinum was observed to be allotriomorphic in character

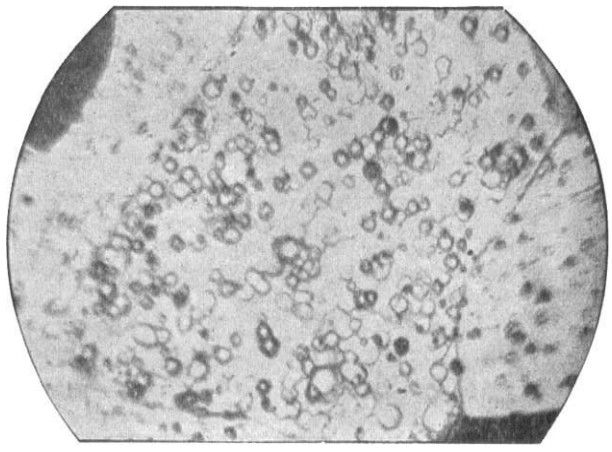

FIG. 2.—Micro-crystalline structure of platinum as seen in section at 360 diameters.

and derived from a system of interfering cubes and octahedra, the cubic and hexagonal form being frequently noticeable. The size of the large crystal grains varied from about 0·002 inch to 0·04 inch in size, and the smaller crystals ranged from about 0·0002 inch to about 0·007 inch. There were indications that the smaller or secondary crystals were each built up of even more minute crystalline ramifications. The crystalline structure of platinum appears to generally resemble that of gold and silver. The descriptive words "primary" and "secondary" crystals are only used in relation to size, and they are not intended to convey the idea of distinctive times of formation during solidification.

February 13.—"Preliminary Note on a Method of Calculating Solubilities and the Equilibrium Constants of Chemical Reactions, and on a Formula for the Latent Heats of Vaporisation." By Alexander Findlay, M.A., B.Sc., Ph.D. Communicated by Prof. Ramsay, F.R.S.

If R and R′ represent the ratios of the absolute temperatures at which two substances have the same solubility, the author shows that $R = R' + c(t' - t)$, where c is a constant having a small positive or negative value and t' and t are the temperatures at which one of the substances has the two values of the solubility in question. The formula is precisely similar to that which Ramsay and Young showed to hold in the case of vapour pressures (*Phil. Mag.*, 1886, xxi. 33). Given the solubility curve of one substance it is therefore possible to calculate the solubility of a second substance provided the solubility of the latter at two temperatures is known. The author shows that this method can be applied to the calculation of "equilibrium constants" of chemical reactions.

It is further shown that if L_1 is the known latent heat of vaporisation at the absolute temperature T_1 of one substance, and L_2 the latent heat of the second substance at the temperature T_2 at which the vapour pressure of the second substance is equal to that of the first at the temperature T_1, then $L_1/L_2 = T_1^{x_1}/T_2^{x_2}$. A less exact, but simpler formula is $L_1 = L_2 T_2^{x}$. These formulæ appear not to be applicable when the pressure exceeds 10,000–20,000 mm.

February 20.—"On a Pair of Ciliated Grooves in the Brain of the Ammocœte, apparently serving to promote the Circulation of the Fluid in the Brain-cavity." By Arthur Dendy, D.Sc., F.L.S., Professor of Biology in the Canterbury College, University of New Zealand. Communicated by Prof. G. B. Howes, F.R.S.

The author demonstrates the existence in the brain of the Ammocœte of a pair of remarkable ciliated grooves. The structures in question were discovered by the author in the